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UNITED STATES PATENT APPLICATION

10 of

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25 Slopeboard Mounting Device

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1 **BACKGROUND OF THE INVENTION**

2 **FIELD OF THE INVENTION**

3 This invention relates to a device for accurately aligning slopeboard mounting brackets
4 (commonly referred to as "lugs") on a tractor, typically a tractor having a primary push blade for
5 earth or snow moving use.

6 **DESCRIPTION OF THE RELATED ART**

7 Tractors with primary push blades have arms which support the primary push blade either
8 inside or outside the tracks or wheels that propel the tractor on the earth. Slopeboards which
9 mount on tractors with outside arms typically attach to the tractor by means of a pair of
10 concentrically aligned mounting brackets attached to the arm about which the slopeboard
11 pivotally rotates. A fluid-powered cylinder links the slopeboard to the tractor and provides the
12 means for raising and lowering the slopeboard.

13 In the earthmoving industry, slopeboards are considered to be an after-market attachment,
14 meaning that the slopeboard is purchased and installed after the tractor has been shipped from
15 the original manufacturing facility, thus requiring a user to install the slopeboard components on
16 the tractor. This installation requires that the installer position and attach the mounting lugs on
17 the tractor arms and blade.

18 Generally, the mounting lugs are attached to the tractor by means of a welding process.
19 The accuracy of the mounting lug positions determines the performance of the slopeboard.

20 A slopeboard which is mounted inaccurately may perform poorly in several areas.

21 First, slopeboard mounting lugs which are not aligned properly will cause the slopeboard
22 to operate in a limited range, thus the slopeboard operator may not be able to meet certain
23 grading requirements that the slopeboard was designed to handle. Second, a slopeboard that is
24 mounted inaccurately may not be able to be raised to a true vertical position, thus violating
25 highway transportation laws related to the overall width of the tractor or causing the slopeboard
26 to interfere with other earthmoving operations that the parent tractor was designed to accomplish.
27 In addition, a slopeboard which is mounted inaccurately may be unsafe, as the angle of the
28 hydraulic cylinder in relation to the slopeboard frame may be insufficient to support the weight
29 of the slopeboard during normal earthmoving activities.

1 The traditional method for installing slopeboard mounting lugs involves following a set
2 of factory-prescribed dimensions contained in a drawing which relates to the slopeboard model
3 being used. The installer is required to make accurate measurements in two to three axes
4 between the center of pivot locations on the mounting lugs. In addition, existing structural
5 elements on the tractor constitute obstructions to measurement and usually require that the
6 installer have the ability to measure through such obstructions because they generally cannot be
7 easily removed.

8 Traditionally, all these dimensions are determined with a tape measure.

9 After having determined the proper locations, the installer may tack weld the lugs in
10 place and actuate the slopeboard to see if the desired performance is met. If the desired
11 performance is not achieved, the installer may repeat the measuring process several times until
12 the installer does achieve the desired performance. This is especially true for the mounting lug
13 that is designed to attach to the closed end of the fluid-powered cylinder. It is important to note
14 that slight variances of just one fourth of an inch may affect the slopeboard range of motion by
15 several degrees.

16 The inventors have a co-pending non-provisional application entitled "Slopeboard
17 Mounting Linkage" 09/640,885 filed on August 18, 2000. That application applies to a linkage
18 which enables a slopeboard which mounts on the outboard arms of a tractor having a primary
19 push blade to travel from zero to ninety degrees.

20 One of the inventors also has concurrently with the present application filed patent
21 application entitled "Improved Slopeboard". That application concerns a slopeboard frame
22 construction using a solid center beam which incorporates mounting positions on the tractor with
23 the mounting positions for a fluid powered cylinder. Incorporating mounting positions on a solid
24 member increases the accuracy of the slopeboard range of motion.

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SUMMARY OF THE INVENTION

2 Use of the present mounting device by a slopeboard installer ensures accurate alignment
3 of slopeboard mounting lug pivot points. This device greatly increases slopeboard performance
4 and safety while reducing installation time.

5 A first end of the slopeboard mounting device is adapted for attachment to a point
6 marked on the slopeboard frame during the manufacture of such frame. When the slopeboard
7 mounting device is attached securely to the proper point on the slopeboard frame, a means for
8 indicating the desired location, such as a pair of pins, attached to the mounting device near a
9 second end of the mounting device aligns and determines the location for the mounting lug that
10 is designed to attach to the closed end of the fluid-powered cylinder.

11 Proper use of the slopeboard mounting device eliminates the need for any measuring
12 during the slopeboard installation. Installers of varying skill levels and experience can
13 accurately install slopeboards with uniform success and in a timely manner.

14 Owners and operators will also benefit by accurate and timely installations. Use of the
15 slopeboard mounting device will decrease installation time and cost. In addition the slopeboard
16 will grade at all the required angles that it was designed to handle and will fold up to a true
17 vertical position while the tractor is performing other operations or being transported on the
18 highway.

1 **BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING**

2 Figure 1 is an isometric view of the slopeboard mounting device.

3 Figure 2 is a top view of the slopeboard mounting device with hidden lines shown so that
4 the method for attaching the pins to the device by means of a bolt is visible.

5 Figure 3 is an isometric view of a slopeboard mounted on the left-hand side of a primary
6 push blade having outside dozer arms. The actual tractor is not shown. The slopeboard
7 mounting device is attached to the slopeboard frame by means of two bolt holes as depicted in
8 Detail A of Figure 3 and is concentrically aligned with the cylinder mounting lug as shown in
9 Detail B of Figure 3.

10 Figure 4 is an isometric view identical to the view in Figure 3 in all ways except that the
11 slopeboard mounting device has been removed and the hydraulic cylinder has been inserted in its
12 place.

13 Figure 5 is a side view of the solid steel front lug assembly which is a subassembly of the
14 slopeboard frame.

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DETAILED DESCRIPTION OF THE INVENTION

2 The preferred embodiment of the present slopeboard mounting device 1 includes a rigid
3 shaft 23; a means for attachment, which is preferably two mounting holes 2, which is located
4 near a first end 24 of said rigid shaft 23 and which serves as a point of attachment for connecting
5 the mounting device 1 to the slopeboard frame 3; and, located near a second end 22 of the rigid
6 shaft 23, a means for indicating the desired location that is preferably a pair of removable pins 4
7 which determine the position for the cylinder mounting lug 5 on the primary push blade 6.

8 Preferably, the manufacturing process for the slopeboard frame 3 requires that the
9 concentrically aligned pivot point 7 be inserted by a precision machine which is capable of
10 precisely plotting coordinates during the same setup as the insertion of the two mounting holes 8
11 which are drilled into the front lug assembly 9. This ensures that the relationship between the
12 pivot point 7 and the two mounting holes 8 in the front lug assembly 9 is sufficiently accurate
13 and constitutes the marking during manufacturing of the point to which the mounting device 1 is
14 to be attached.

15 The slopeboard mounting device 1 is preferably manufactured using steel tubing because
16 of its stiffness and durability. The preferred design consists of two arms 18, 19 joined at
17 substantially a ninety-degree angle which allows the mounting device 1 to clear existing
18 obstructions such as the blade strut 10. It is important to note that different makes and models of
19 tractors may require different mounting device designs. The two pins 4 are manufactured with a
20 concentric hole going through the entire length of each pin. One pin 4 has a threaded hole while
21 the other pin 4 has a non-threaded hole which is slightly larger in diameter than the diameter of
22 the shaft 20 of the bolt 11 which secures the pins to the mounting device 1. Continuing with a
23 discussion of the preferred embodiment, an aperture 21 is located near the second end 22 of the
24 rigid shaft 23. The bolt 11 passes through the pin 4 having the non-threaded hole, through the
25 aperture 21, and into the pin 4 having the threaded hole.

26 The key principle regarding the functionality of the slopeboard mounting device 1 is the
27 relationship between the two mounting holes 2 and the removable pins 4. In the preferred
28 embodiment, accuracy between these two points is preferably maintained by joining the two
29 arms 18, 19 which make up the body of the mounting device 1 and then drilling the holes using a
30 precision machine which is capable of precisely plotting the desired coordinates. In general, all

1 that is essential, however, is that the slopeboard mounting device 1 be a rigid structure of such
2 shape and size that the means for indicating the desired location, preferably the pair of removable
3 pins 4, is maintained at a desired position with respect to the first end 24 of the rigid shaft 23
4 which is the same position as is desired for the lug pivot point 7 to have with respect to the
5 slopeboard frame 3. Preferably, though, the shape and dimensions of the rigid shaft 23 are
6 selected such that any obstructions are avoided by such rigid shaft 23.

7 The slopeboard mounting device 1 is generally used only once during the installation of
8 the slopeboard frame 3 on the parent machine. In particular it is used to align the slopeboard
9 pivot point 7 with the cylinder mounting lug 5 so that when the slopeboard cylinder 12 is
10 actuated, the slopeboard will perform properly.

11 The method for using the slopeboard mounting device 1 is as follows: The installer pins
12 the slopeboard mounting lugs 13 to the slopeboard frame 3. The installer then mounts the
13 slopeboard on the dozer arm 14 and positions the slopeboard cutting edge 17 even with the
14 cutting edge on the primary push blade 6. The slopeboard mounting device 1 is then bolted to a
15 pre-marked location on the front lug assembly 9, and the bolt 11 is removed from the pair of pins
16 4 thus releasing the pins from the mounting device 1. The cylinder mounting lug 5 is then
17 aligned concentrically with the hole from which the bolt 11 and the pair of pins 4 were
18 previously removed. The pair of pins 4 is then inserted through the pivot point on the cylinder
19 mounting lug 5, and the bolt 11 is inserted through the pin 4 without threads, through the
20 aperture 21 of the mounting device 1 and threaded into the pin 4 which has the internal threads.
21 The cylinder lug base plate assembly 15 is tack welded to the back of the primary push blade 6
22 and flush with the bottom of the cylinder lug 5. The cylinder lug 5 is then tack welded to the top
23 of the cylinder lug base plate assembly 15 thus joining the entire cylinder mount to the back of
24 the primary push blade 6.

25 The slopeboard mounting device 1 is then unbolted from the slopeboard frame 3 and the
26 pins 4 are removed from the cylinder mounting lug 5. The closed end of the slopeboard cylinder
27 12 is then pinned to the pivot hole on the cylinder mounting lug 5, and the cylinder rod 16 is
28 extended and pinned to the front lug assembly 9 which is attached to the slopeboard frame 3. At
29 this point the slopeboard pivot 7 and the cylinder mounting lug 5 are properly aligned and the
30 installation can be completed in preparation for earthmoving activities.